

CLAIMS

Claim 1. (Currently Amended) A method comprising:

disposing on a surface, a layer of material, said layer of material having a thickness of between about 1000 and 10000 and comprising an optically tuned planarizing layer, said tuned layer having an index of refraction layer (n) from about 1.4 to about 2.1, and an extinction coefficient (k) from about 0.1 to 0.6 at 365, 248 193 and 157 nm comprising a polymeric resin, said polymeric resin being selected from the group consisting of novolac/diazonapthoquinone resin, polysulfones, polyhydroxystyrene based materials, ~~polyimide~~ polyimide materials cast from solvents substantially free of amines, and blends thereof, said resin containing a covalently bonded chromophore used to modulate the optical properties of said material and a variety of wavelengths;

a polyfunctionalized crosslinking agent selected from the group consisting of mono-, di-, multi hydroxy substituted methylphenols, aminoplasts, urea resins, glycoluril resins, melamines; and

a thermal acid generator comprising compounds that undergo catastrophic decomposition at a given threshold temperature that results in the formation of one or more molecules of a strong acid;

disposing on said layer of material a layer of resist material;

said layer of material having a crosslink density sufficiently high that said material and said resist material do not substantially intermix;

said layer of material being thicker than said layer of resist material, and forming a multilayer resist structure exhibiting sub 200 nm resolution.

2. (Currently Amended) A method according to claim 1, wherein said layer of material is novolac/diazonapthoquinone resin.

3. (Canceled) A method according to claim 1, wherein said polymeric resin is selected from the group consisting novolac/diazonaphthoquinone resists, polysulfones, polyhydroxystyrene based materials, polyimide materials cast from solvents amines.
4. (Original) A method according to claim 1, wherein said resist is exposed to energy to form a pattern in said resist.
5. (Original) A method according to claim 4, wherein said energy is a beam selected from the group consisting of electromagnetic radiation and a particle beam.
6. (Currently amended) A method comprising :
disposing on a surface a layer of material, said layer of material having a thickness of between about 1000 and 10000 and comprising an optically tuned planarizing layer, said tuned layer having an index of refraction layer (n) from about 1.4 to about 2.1, and an extinction coefficient (k) from about 0.1 to 0.6 at 365, 248 193 and 157 nm comprising a polymeric resin, said polymeric resin being selected from the group consisting of novolac/diazonaphthoquinone resin, polysulfones, polyhydroxystyrene based materials, polyimide materials cast from solvents containing no amines, and blends thereof, said resin containing a covalently bonded chromophore used to modulate the optical properties of said material and a variety of wavelengths;;
disposing on said layer, a top layer of material which is a resist material, wherein when said top layer resist material is a bilayer resist, said resist is selected from the group consisting of Si-containing acrylates/methacrylates, Si-containing styrene derivatives, Si-containing norbornene materials, silsesquioxanes, silanes, siloxanes, and when said top layer resist material is a top surface imaging resist, said resist is selected from the group consisting of acrylates/methacrylates, styrene based polymers and cyclic olefins;
said material having a crosslink density sufficiently high that said material and said resist do not substantially intermix;

said resist is exposed to energy to form a pattern in said resist;
said energy is a particle beam;
wherein said particle beam is an electron beam;
forming a pattern in said resist material, developing said pattern to form a sub 200 nm feature in said layer of material.

7. (Canceled) A method according to Claim 1 wherein said layer of material has an index of refraction from about 1.4 to about 2.1, and an extinction coefficient from about 0.1 to 0.6 at 365, 248 193 and 157 nm.

8. (Canceled) A method comprising:
disposing on a surface a layer of material;
disposing in said layer of material a resist material;
said material having a crosslink density sufficiently high that said material and said resist do not substantially intermix; and
forming a pattern in said resist material, developing said pattern to form a sub 200 nm feature in said layer of material.

9. (Withdrawn) A method according to claim 8, wherein said novolac has an index of refraction which is greater than about 1.65 and less than about 1.95 at wavelength of 248nm. and an extinction coefficient from about 0.1 to 0.6 at 365, 248, further including forming a pattern in said resist to form a sub 200 nm feature in said layer of material.

10. (Withdrawn) A method according to claim 8, wherein said novolac has an extinction coefficient $0.12 < k < 0.45$ at wavelength of 248nm.

11. (Withdrawn) A method according to claim 8, wherein said novolac has a molecular weight ranging from 2000 to 30000, preferably above 8500 and polydispersity ranging from 1 to 15, preferably less than 3.

12. (Withdrawn) A method according to claim 8, wherein said novolac has been crosslinked with heat to a temperature range of 180°C to 252°C under different processing conditions.

13. (Withdrawn) A method according to claim 8, wherein said novolac has been crosslinked with mid and deep UV or e-beam or other sort of irradiation.

14. (Withdrawn) A method according to claim 8, wherein said novolac has a thickness ranging from 2000 to 10000Å.

15. (Withdrawn) A method according to Claim 8, wherein said novolac has been removed by dry etching process in an oxygen plasma.

16. (Withdrawn) A method according to claim 2, wherein said layer of novolac material has an index of refraction from about 1.65 to about 1.95 and an extinction coefficient from about 0.16 to about 0.4 at 248nm.

17. (Withdrawn) A structure comprising:
a surface having a layer of material disposed therein;
a layer of resist material disposed on said layer of material;
said material having a crosslink density sufficiently high that said material and said resist are not substantially intermixed.

18. (Previously Presented) A method according to claim 1 wherein said crosslink density is dependent upon the processing conditions comprising temperature, time, the formulations of said layer of material, the crosslinker that is put into the formulation and the amount of crosslinker.

19. (Withdrawn) A method comprising:

disposing on a surface of an electronic device a novolac material;

curing said material to a predetermined degree of crosslinking;

disposing on said novolac material a resist material, the degree of crosslinking being sufficient to substantially prevent said resist material from intermixing with said novolac material;

exposing said resist material to a pattern of energy selected from the group consisting of electromagnetic radiation and a particle beam to form a pattern of exposed and unexposed regions in said resist;

developing said pattern to remove either said exposed or said unexposed regions of said resist to expose said layer of material where said resist is removed;

removing said layer of material where said resist is removed to leave on said electronic device a bilayer of said novolac material and said resist having a pattern therein having regions within which said surface of said electronic device is exposed.

20. (Previously Presented) A method according to claim 1 wherein said crosslinking agent is a glycouril resin, said thermal acid generator is p-nitrobenzyl tosylate and said polymeric resin is a copolymer of polyhydroxystyrene and polyhydroxystyrene reacted with an anthracenemethanol.